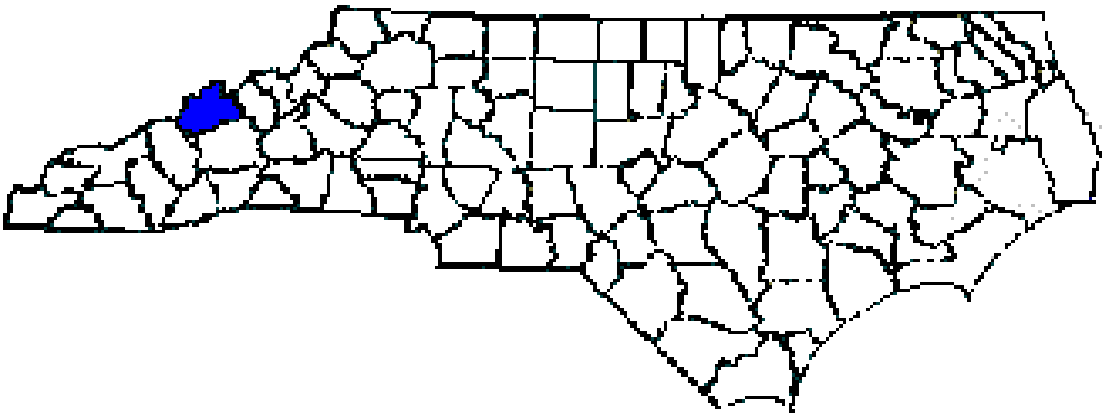
ANNUAL REPORT FOR 2012



Ivy Gap Branch Site N Mitigation Site
Madison County
TIP No. R-2518A
COE Action ID: SAW-2007-2197-357/300
DWQ #: 20071134

Prepared By:
Natural Environment Section & Roadside Environmental Unit
North Carolina Department of Transportation
December 2012

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SUMMARY

The following report summarizes the stream monitoring activities that have occurred during the Year 2012 at the Ivy Gap Branch Site N Mitigation Site in Madison County. The North Carolina Department of Transportation (NCDOT) completed this project in January 2009 (Sta. 10+00 to 10+90) and May 2011 (Sta. 10+90 to 12+25). This report provides the monitoring results for the third formal year of monitoring (Year 2012). The Year 2012 monitoring period was the third of five scheduled years of monitoring on the Ivy Gap Branch Site N Mitigation Site (See Success Criteria Section 2.1).

Based on the overall conclusions of monitoring at the Ivy Gap Branch Site N, it has met the required monitoring protocols for the third formal year of monitoring on the stream and first formal year of monitoring on the planted vegetation. The channel throughout the stream relocation site is stable at this time. The eroded area noted during the 2011 (Year 2) monitoring evaluation from Sta. 11+15 to 11+20 Rt. was repaired in March 2012. The streambank and buffer area were planted in March 2012 with live stakes and bareroot seedlings. The planted vegetation is surviving at this time. NCDOT will continue stream monitoring at the Ivy Gap Branch Site N Mitigation Site in 2013.

1.0 INTRODUCTION

1.1 Project Description

The following report summarizes the stream monitoring activities that have occurred during the Year 2012 at the Ivy Gap Branch Site N Mitigation Site. Site N is located on US 19 in Madison County at Sta. 82+20 to 82+50 -L- Rt. and Sta. 82+80 to 84+20 -L- Lt. (Figure 1). The Ivy Gap Branch Site N was constructed to provide mitigation for stream impacts associated with Transportation Improvement Program (TIP) number R-2518A in Madison County.

The mitigation site provided approximately 148 linear feet of stream preservation and 581 linear feet of stream relocation. Construction was completed in January 2009 (Sta. 10+00 to 10+90) and May 2011 (Sta. 10+90 to 12+25). The stream relocation involved excavation of a new floodplain and channel, installing several in-stream cross vane structures and planting the riparian buffer zone.

1.2 Purpose

In order for a mitigation site to be considered successful, the site must meet the success criteria. This report details the monitoring in 2012 at the Ivy Gap Branch Site N Mitigation Site. Hydrologic monitoring was not required for this site.

1.3 Project History

January 2009	Construction Completed (Sta. 10+00 to 10+90)
March 2009	Site Planted (Type I only)
October 2009	As-Built Survey Completed (Sta. 10+00 to 10+90)
November 2010	Stream Channel Monitoring (Year 1)
May 2011	Construction Completed (Sta. 10+90 to 12+25)
November 2011	As-Built Survey Completed (Sta. 10+90 to 12+25)
November 2011	Stream Channel Monitoring (Year 2)
March 2012	Stream Repairs (Sta. 11+15 to 11+20 Rt.)
March 2012	Site Planted (Type I and II)
September 2012	Vegetation Monitoring (Year 1)
November 2012	Stream Channel Monitoring (Year 3)

1.4 Debit Ledger

The entire Ivy Gap Branch Site N stream mitigation site was used for the R-2518A project to compensate for unavoidable stream impacts.

Figure 1. Vicinity Map

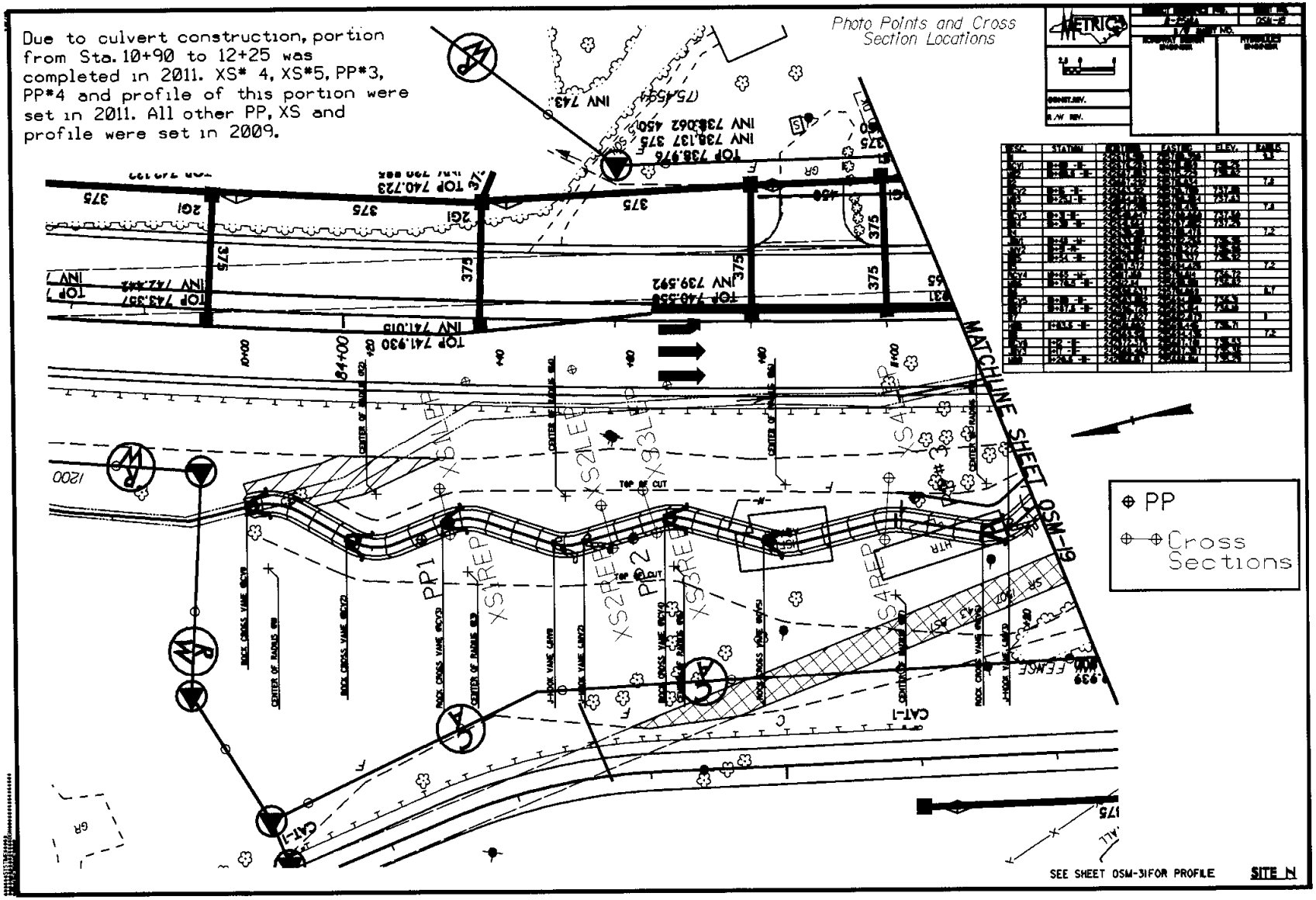


Figure 2. Site N Map

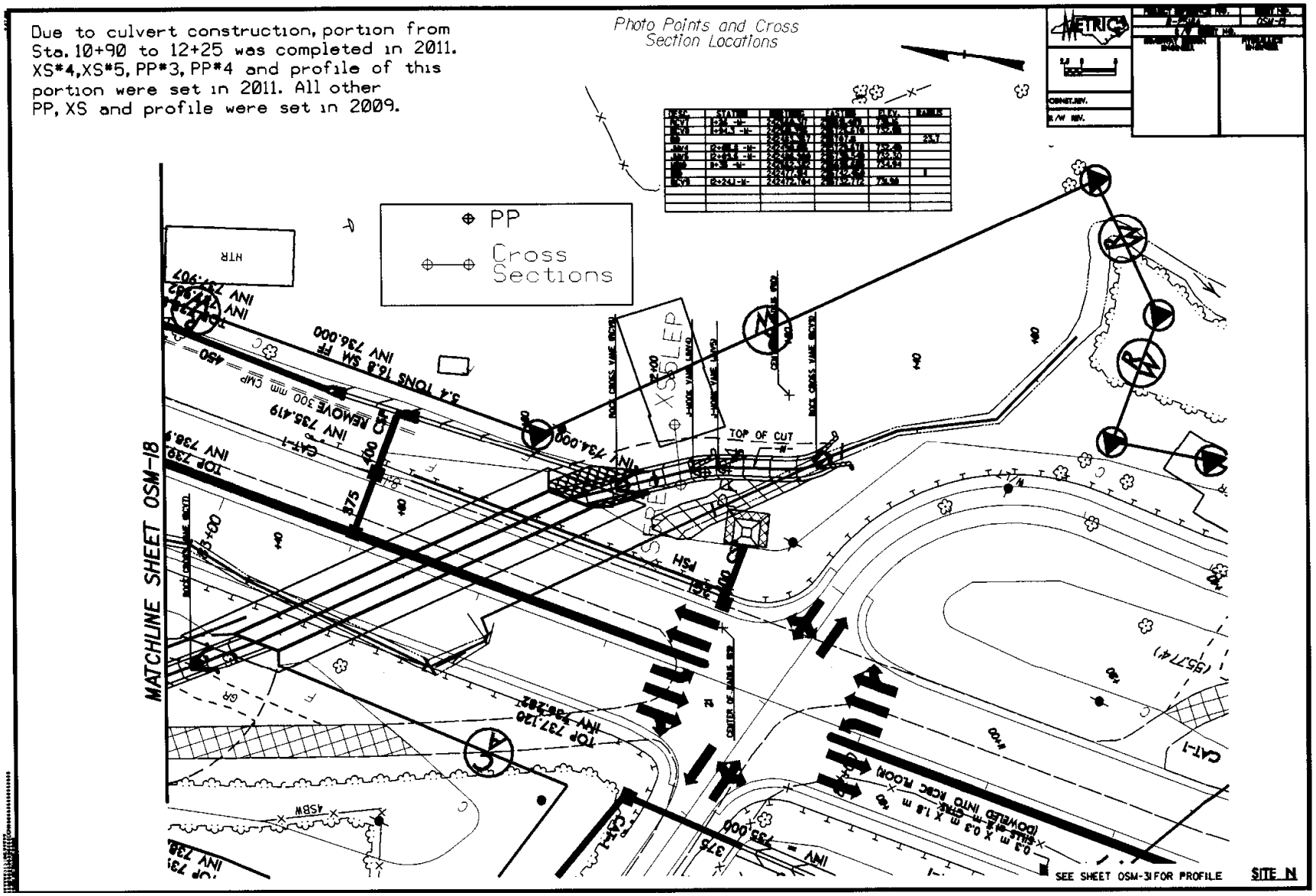


Figure 3. Site N Map

2.0 STREAM ASSESSMENT

2.1 Success Criteria

The permittee shall monitor the restoration and enhancement mitigation sites following the Level 1 protocols outlined in the "Stream Mitigation Guidelines," dated April 2003 with the following exceptions:

1. Pebble counts shall not be conducted.

2. Two cross sections shall be conducted for streams less than 500 linear feet and five (5) cross sections shall be conducted for streams greater than 500 linear feet.

3. Riparian success shall be by visual inspection of plant survival. Photos will be taken and comments noted on plant survival.

The permittee shall monitor the preservation sites by visual inspection. Photos will be taken and comments noted on plant survival. The monitoring shall be conducted annually for a minimum of five (5) years after final planting. The monitoring results shall be submitted to DWQ in a final report within sixty (60) days after completing monitoring. After 5 years the NCDOT shall contact the DWQ to schedule a site visit to "close out" the mitigation site.

2.2 Stream Description

2.2.1 Post-Construction Conditions

The stream relocation of the Ivy Gap Branch Site N Mitigation Site involved excavation of a new floodplain and channel, installing several in-stream cross vane structures and planting the riparian buffer zone.

2.2.2 Monitoring Conditions

The objective of the Ivy Gap Branch Site N stream restoration/relocation was to restore a B4c stream as identified in Rosgen's Applied River Morphology. A total of five cross sections (three in a riffle and two in a pool) were surveyed. For this report, only cross sections containing riffles were used in the comparison of channel morphology presented below in Table 1 (Site I).

Table 1. Abbreviated Morphological Summary (Ivy Gap Branch Site N)

Variable	Proposed	Cross-Section #2 (Riffle)	Cross-Section #4 (Riffle)	Cross-Section #5 (Riffle)	**Min. – Max Values (Riffle Sections Only)**
		2012	**2012**	**2012**	**2012**
Drainage Area (mi^2)	**1.14**	1.14	1.14	1.14	1.14
Bankfull Cross Sectional Area (ft^2)	**12.8**	20.96	20	35.43	20 – 35.43
Maximum Bankfull Depth (ft.)	**1.3**	2.85	2.64	2.69	2.64 – 2.85
Width of the Floodprone Area (ft.)	**10.0**	22	25	35	22 – 35
Bankfull Mean Depth (ft.)	**1.03**	1.41	1.55	1.62	1.41 – 1.62
Width/Depth Ratio	**12**	10.52	8.31	13.46	8.31 – 13.46
Entrenchment Ratio	**1.7**	1.48	1.94	1.6	1.48 – 1.94
Bankfull Width (ft.)	**12.4**	14.84	12.88	21.81	12.88 – 21.81

* Riffle values are used for classification purposes, pool values are shown in Appendix A.

2.3 Results of the Stream Assessment

2.3.1 Site Data

The assessment included the survey of five cross sections and the longitudinal profile of the Ivy Gap Branch Site N established by NCDOT after construction. The length of the profile along the Ivy Gap Branch Site N was approximately 593 linear feet. Five cross sections were established during the as-built monitoring year. Cross section locations were subsequently based on the stationing of the longitudinal profile and are presented below. The location of the cross sections and longitudinal profile are shown in Appendix A.

Ivy Gap Branch Site N Cross-Sections:

- Cross-Section #1: Ivy Gap Branch Site N, Station 133+00, midpoint of pool
- Cross-Section #2: Ivy Gap Branch Site N, Station 214+50, midpoint of riffle
- Cross-Section #3: Ivy Gap Branch Site N, Station 236+00, midpoint of pool
- Cross-Section #4: Ivy Gap Branch Site N, Station 356+50, midpoint of riffle
- Cross-Section #5: Ivy Gap Branch Site N, Station 704+00, midpoint of riffle

Based on comparisons of the As-Built to the monitoring data, all of the cross sections appear stable with little or no active bank erosion. Graphs of the cross sections are presented in Appendix A. Future survey data will vary depending on actual location of rod placement and alignment; however, this information should remain similar in appearance. The longitudinal profile showed that the channel was stable for the 2012 monitoring evaluation. Pebble counts were not required per the permit conditions and therefore were not completed.

3.0 VEGETATION: IVY GAP BRANCH SITE N

3.1 Description of Species

The following tree species were planted on the streambank:

Salix nigra, Black Willow

Cornus amomum, Silky Dogwood

The following tree species were planted in the buffer area:

Liriodendron tulipifera, Yellow Poplar

Platanus occidentalis, Sycamore

Fraxinus pennsylvanica, Green Ash

Quercus alba, White Oak

3.2 Results of Vegetation Monitoring

Streambank & Buffer Vegetation: The streambank reforestation was completed in March 2012. The Year 1 vegetation monitoring evaluation noted: Type I: Black Willow, Silky Dogwood and Type II: Sycamore, Green Ash, Tulip Poplar, and White Oak were surviving at the time of the monitoring evaluation.

3.3 Conclusions

NCDOT will continue to monitor the planted vegetation in 2013.

4.0 OVERALL CONCLUSIONS/RECOMMENDATIONS

The Ivy Gap Branch Site N Mitigation Site has met the required monitoring protocols for the third formal year of monitoring on the stream and the first formal year of monitoring on the planted vegetation. The channel throughout the stream relocation site is stable and the planted vegetation is surviving at this time. NCDOT will continue monitoring the Ivy Gap Branch Site N Mitigation Site in 2013.

5.0 REFERENCES

Stream Mitigation Plan, US Highway 19, R-2518A On-Site Mitigation Madison County, North Carolina, August 2006.

Design Plans for R-2518A, US 19 from I-26 to 0.8 KM east of the Yancey Co. Line, Stream Mitigation (Preservation, Enhancement, and Restoration), HSMM.

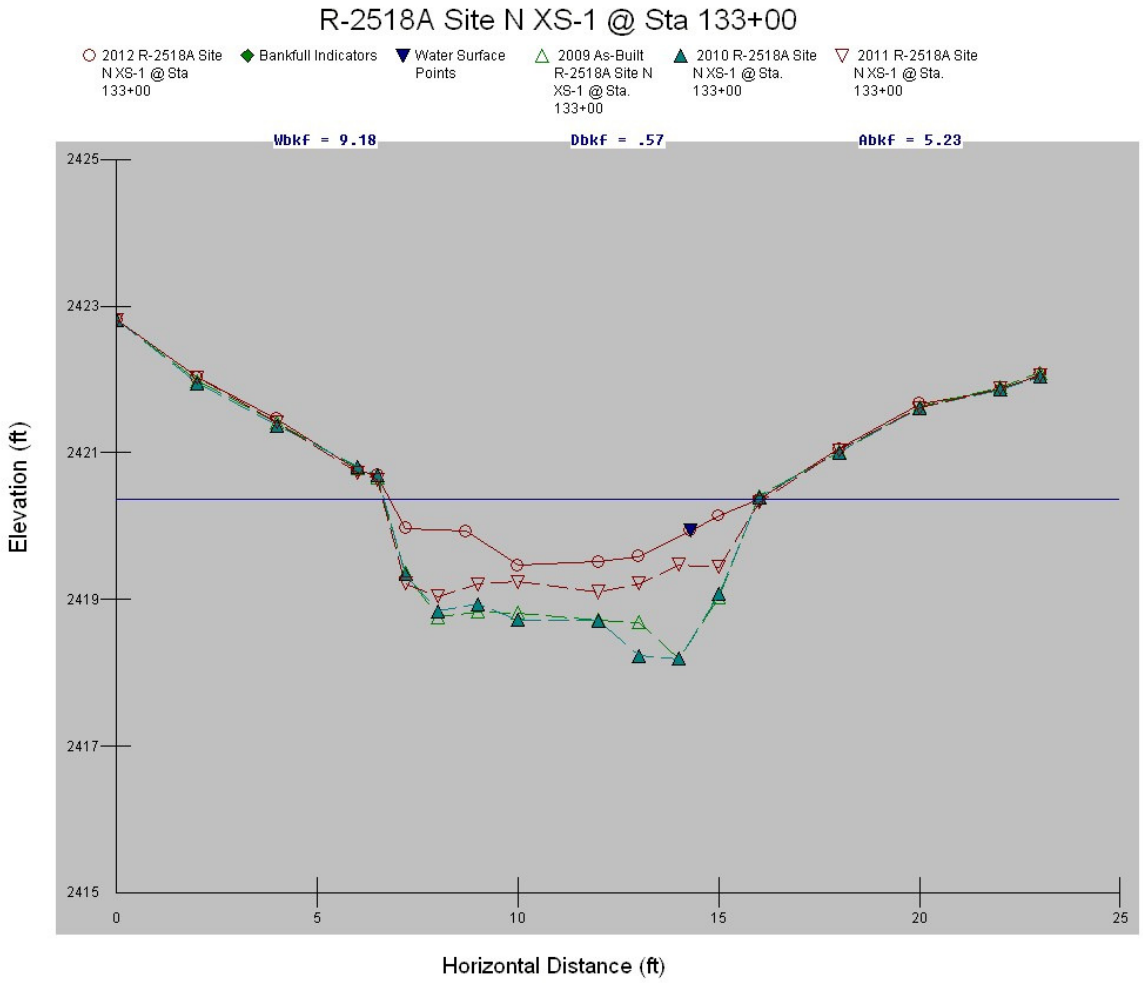
North Carolina Department of Transportation (NCDOT), April 29, 2008. 404 and 401 Individual Permits for R-2518A and R-2518B (ACOE Permit No. 2007-2197-357/300 and DWQ Project No. 20071134, Individual Certification No. 3706).

Rosgen, D.L, 1996. Applied River Morphology. Wildland Hydrology, Pagosa Springs, Colorado.

US Army Corps of Engineers (USACE), 2003. Stream Mitigation Guidelines. Prepared with cooperation from the US Environmental Protection Agency, NC Wildlife Resources Commission, and the NC Division of Water Quality.

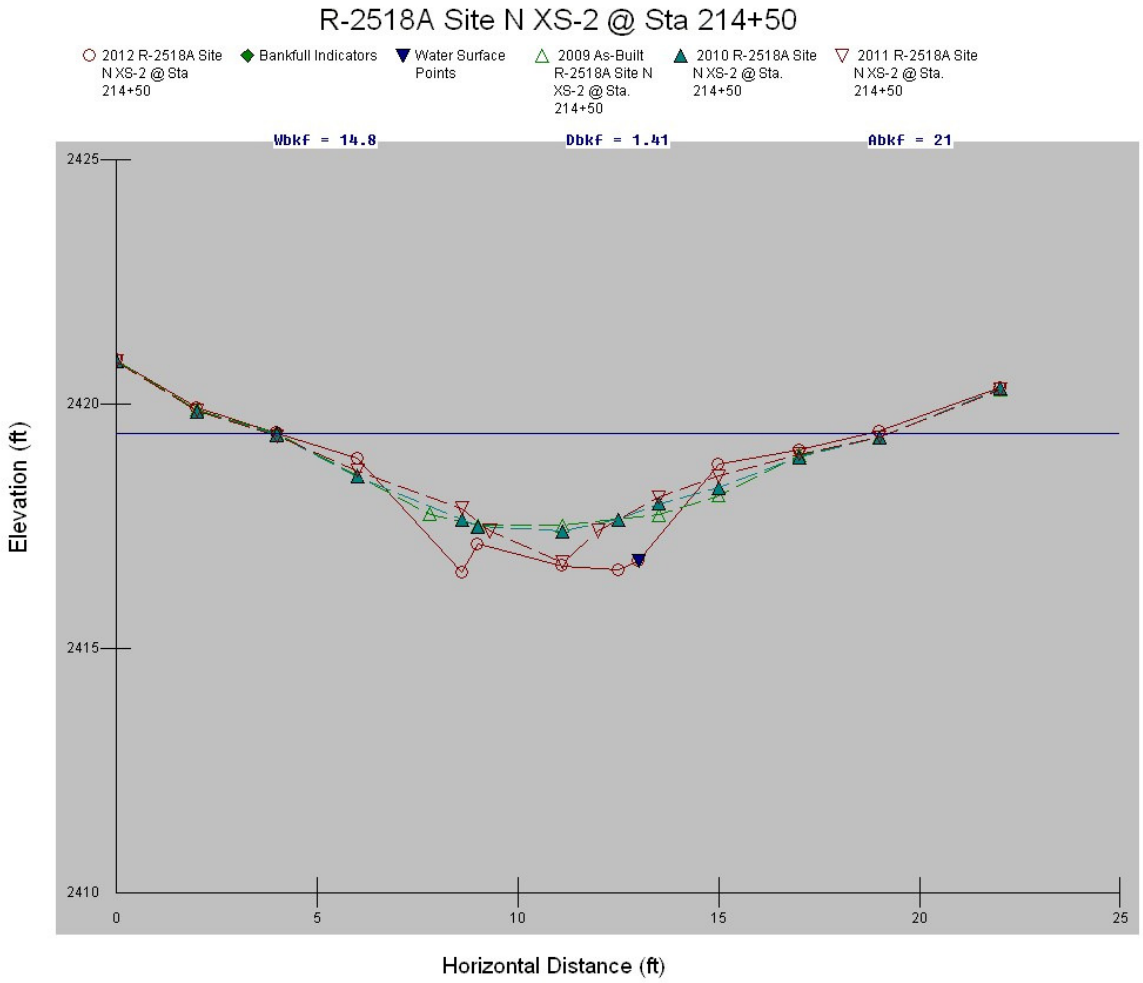
APPENDIX A

CROSS SECTIONS AND LONGITUDINAL PROFILE

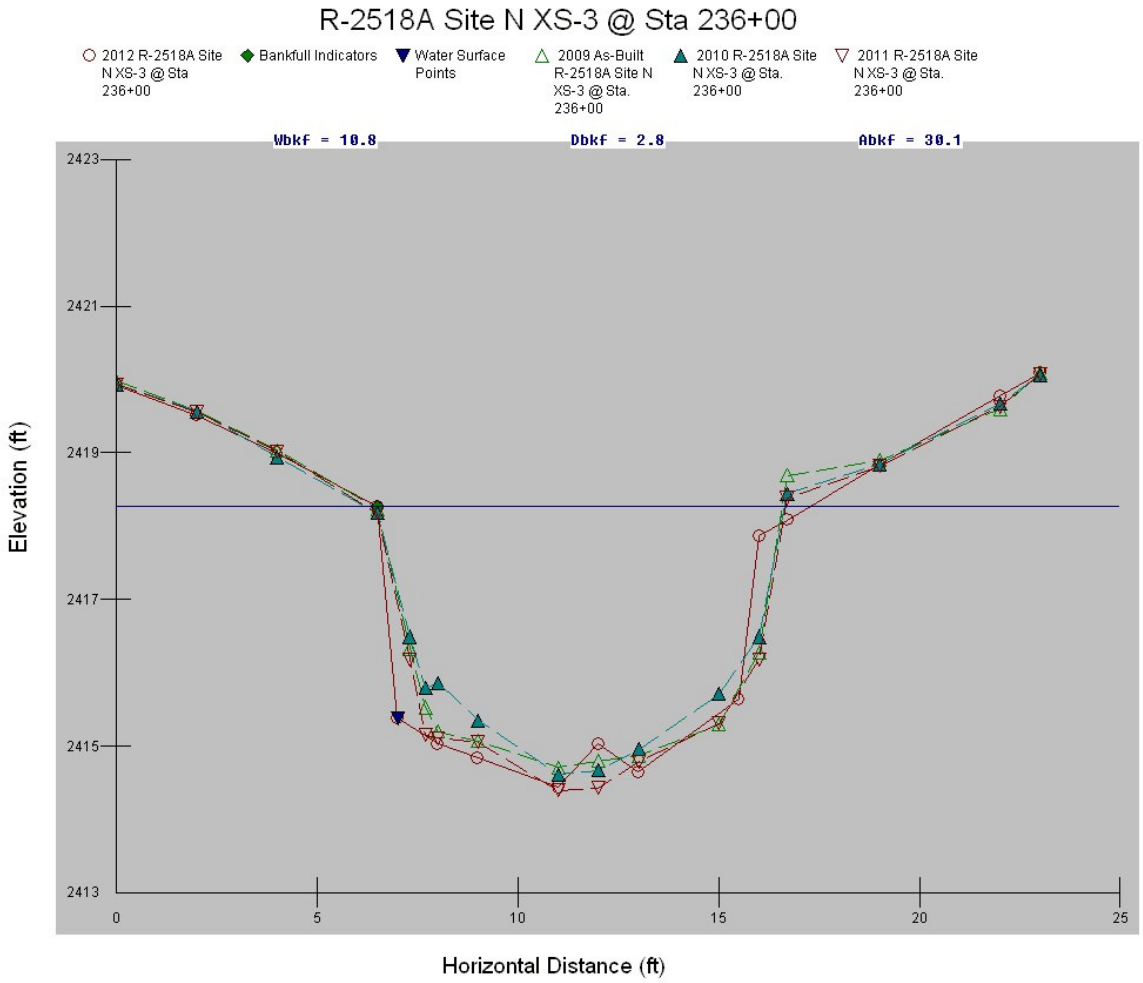


Site N: Cross-Section #1 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	14.26	12.34	5.23		
Maximum Bankfull Depth (ft.)	2.2	1.59	0.9		
Bankfull Mean Depth (ft.)	1.53	1.19	0.57		
Bankfull Width (ft.)	9.34	10.37	9.18		

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

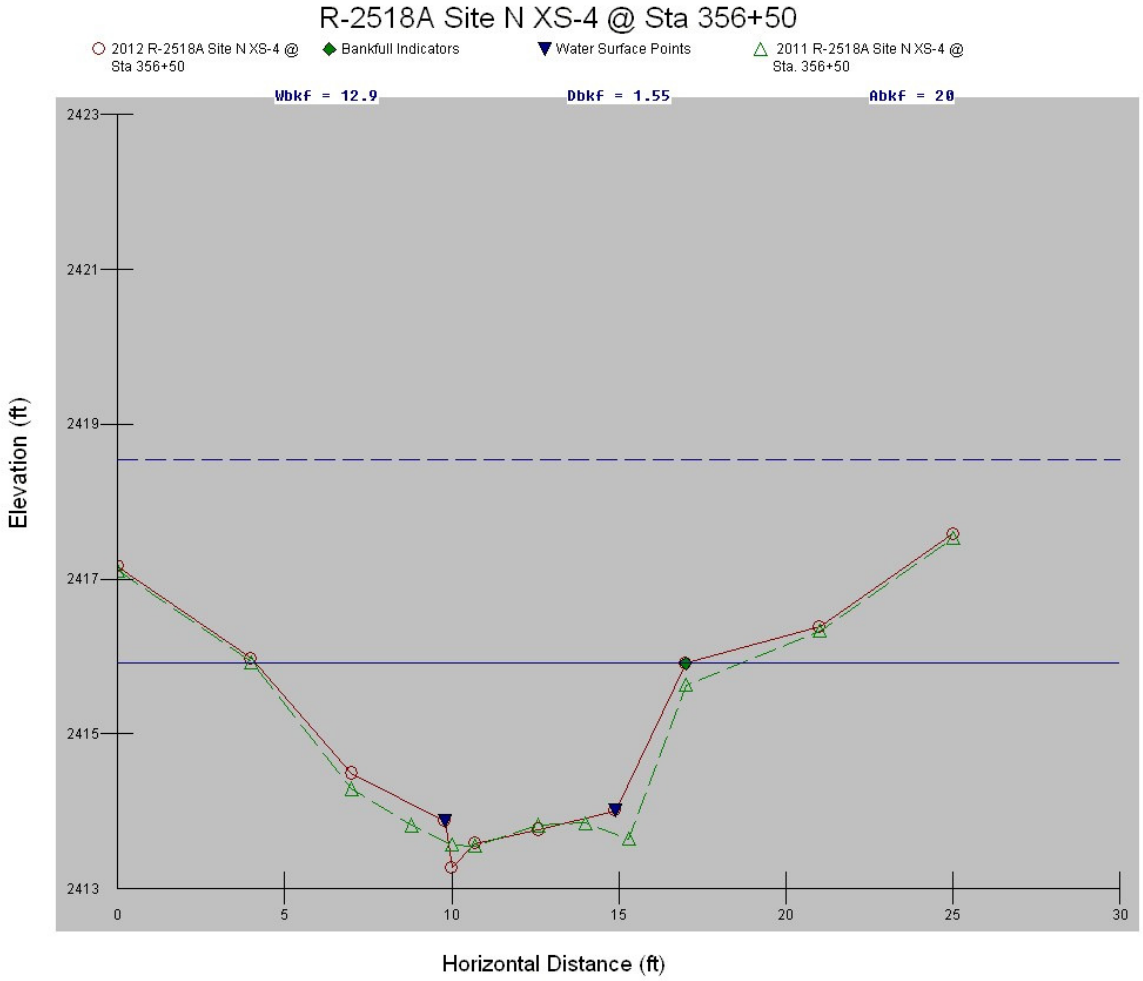


Site N: Cross-Section #2 (Riffle) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	17.17	11.37	20.96		
Maximum Bankfull Depth (ft.)	1.98	2.21	2.85		
Width of the Floodprone Area (ft.)	22	22	22		
Bankfull Mean Depth (ft.)	1.13	0.95	1.41		
Width/Depth Ratio	13.43	12.59	10.52		
Entrenchment Ratio	1.45	1.84	1.48		
Bankfull Width (ft.)	15.18	11.96	14.84		

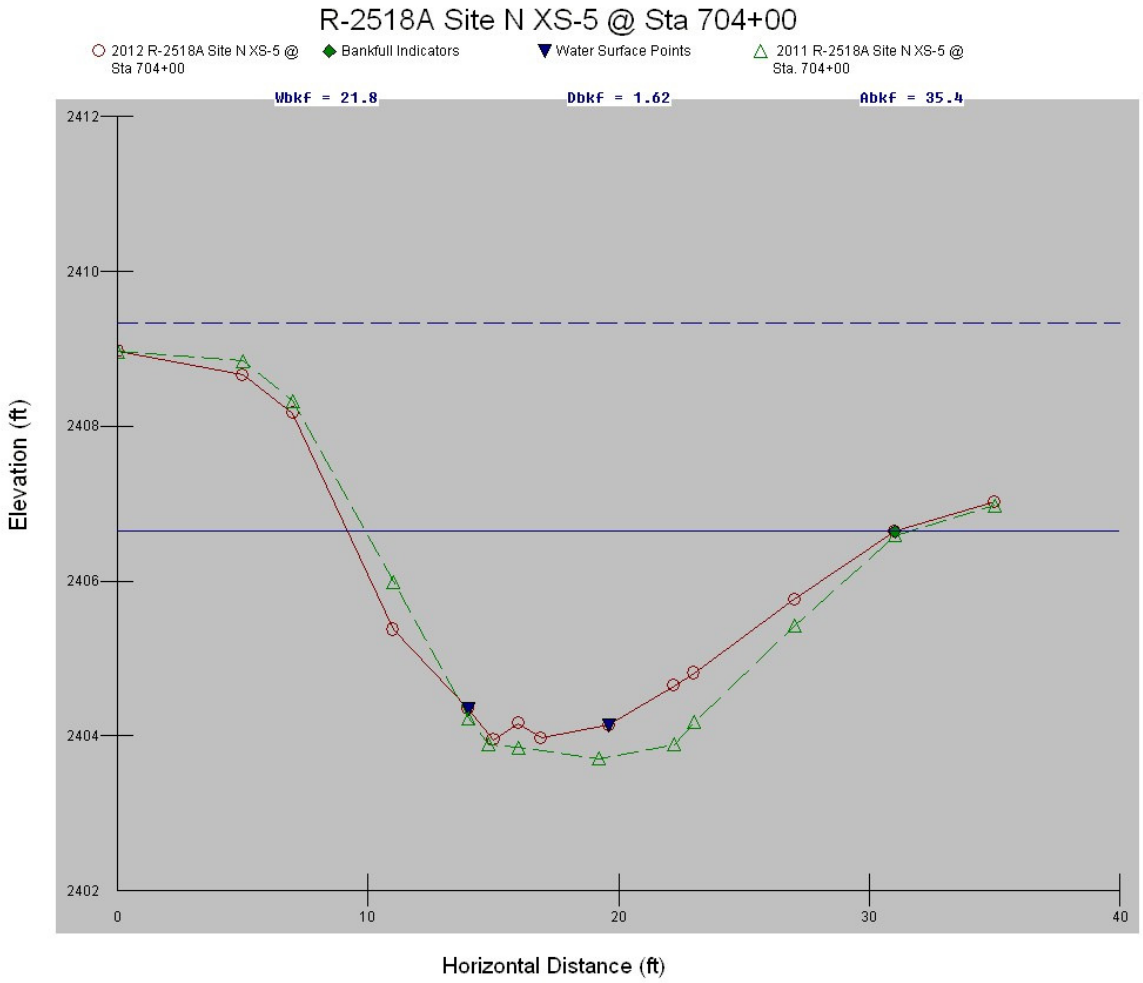


Site N: Cross-Section #3 (Pool) Abbreviated Morphological Summary					
	2010	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	26.36	29.4	30.1		
Maximum Bankfull Depth (ft.)	3.57	3.78	3.82		
Bankfull Mean Depth (ft.)	2.61	2.9	2.8		
Bankfull Width (ft.)	10.11	10.14	10.75		

*According to the Rosgen Classification of Natural Rivers floodprone width, entrenchment ratio, and width depth ratio are not measured in pool, glide, or run features.

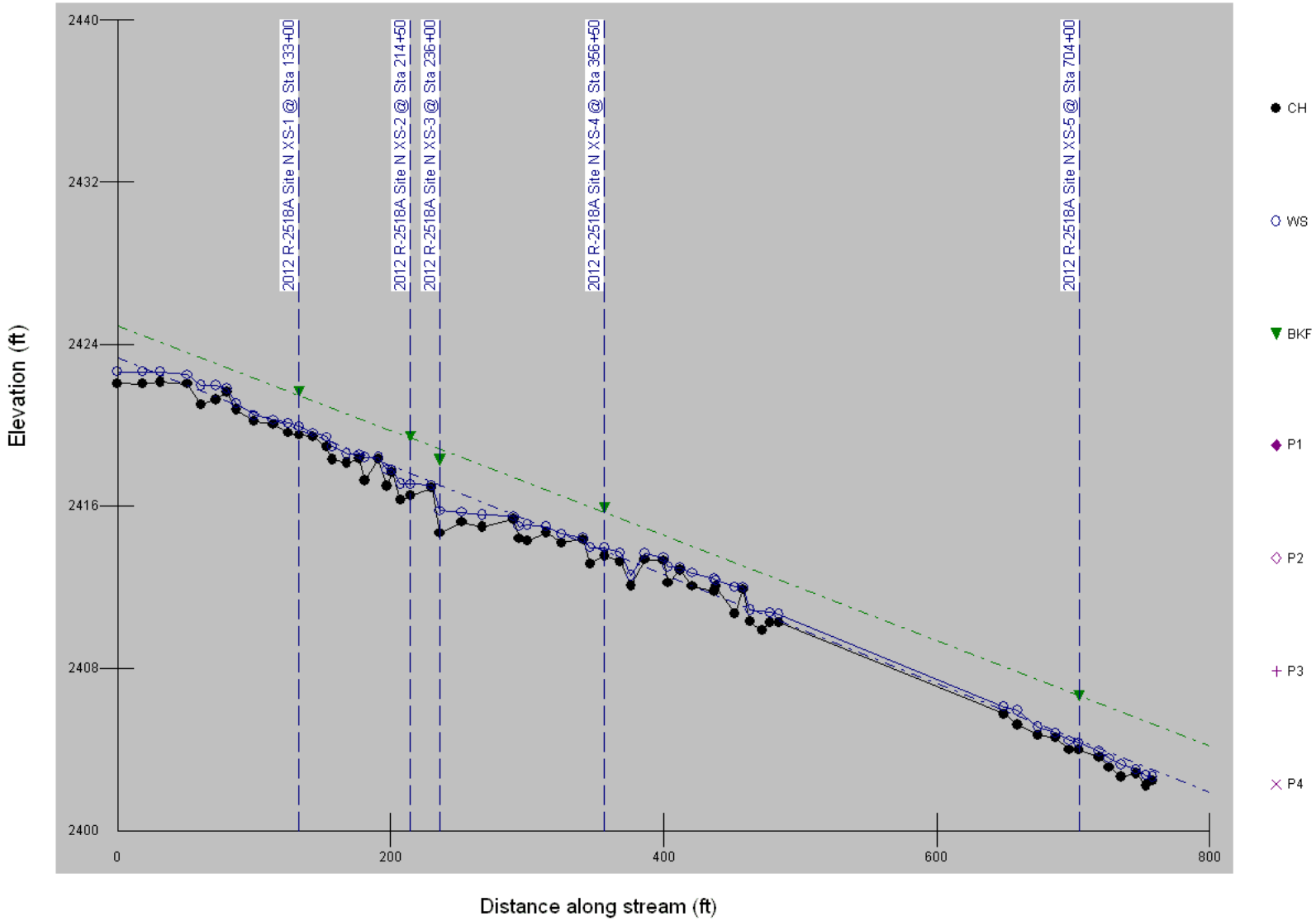


Site N: Cross-Section #4 (Riffle) Abbreviated Morphological Summary				
	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	18.6	20		
Maximum Bankfull Depth (ft.)	2.08	2.64		
Width of the Floodprone Area (ft.)	25	25		
Bankfull Mean Depth (ft.)	1.49	1.55		
Width/Depth Ratio	8.36	8.31		
Entrenchment Ratio	2.01	1.94		
Bankfull Width (ft.)	12.45	12.88		



Site N: Cross-Section #5 (Riffle) Abbreviated Morphological Summary				
	2011	2012	2013	2014
Bankfull Cross Sectional Area (ft^2)	38.94	35.43		
Maximum Bankfull Depth (ft.)	2.88	2.69		
Width of the Floodprone Area (ft.)	35	35		
Bankfull Mean Depth (ft.)	1.85	1.62		
Width/Depth Ratio	11.37	13.46		
Entrenchment Ratio	1.66	1.6		
Bankfull Width (ft.)	21.03	21.81		

R-2518A Site N Profile



APPENDIX B

SITE PHOTOGRAPHS AND LONGITUTINAL PROFILE

Ivy Gap Branch Site N

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream)

Photo Point #2 (Downstream)

Photo Point #3 (Upstream)

Photo Point #3 (Downstream)

November 2012

Ivy Gap Branch Site N

Photo Point #4 (Upstream)
November 2012

Photo Point #4 (Downstream)

Ivy Gap Branch Site N

Vegetation Overview Photo (Looking Upstream from US 19)

Vegetation Overview Photo (Looking Downstream from US 19)

September 2012